Non-Dispersive Atomic Absorption System for Engine Health Monitoring, Phase I

Completed Technology Project (2009 - 2010)

Project Introduction

We propose to design, construct and test a first implementation of a non-dispersive technique for the measurement of atomic absorption in the plumes of liquid rocket engines in altitude test facilities. Led by NASA Stennis Space Center (SSC), the observation of metal atom emission from liquid rocket engine exhausts at sea level conditions has become a highly successful health monitoring technique, but in altitude tests emission intensities are low. SSC developed an atomic absorption system which has provided useful measurements, but improved sensitivity is required. Non-dispersive atomic absorption presents a far simpler, smaller, lower cost alternative to other techniques with comparable spectral resolution and, of particular importance, should allow a more forgiving receiver geometry, so that noise-modulated source light or plume emission can be eliminated.

Anticipated Benefits

Potential applications exist in two areas, plume signature phenomenology, and analytical chemistry instrumentation. We have a long history in the first area and are currently involved in a research program in which the spectroscopy of rocket exhaust plumes may play a key role in developing new early warning systems, to which the technology to be developed in the proposed program could make a substantial contribution. In the second area, non-dispersive methods have received many academic studies but few commercial applications. The new source, filter and detector technologies we expect to take advantage of in the proposed program, on the other hand, may allow new analytical instruments that are cheaper and more robust than previous instruments, while retaining the capabilities afforded by the high spectral resolution of non-dispersive methods.

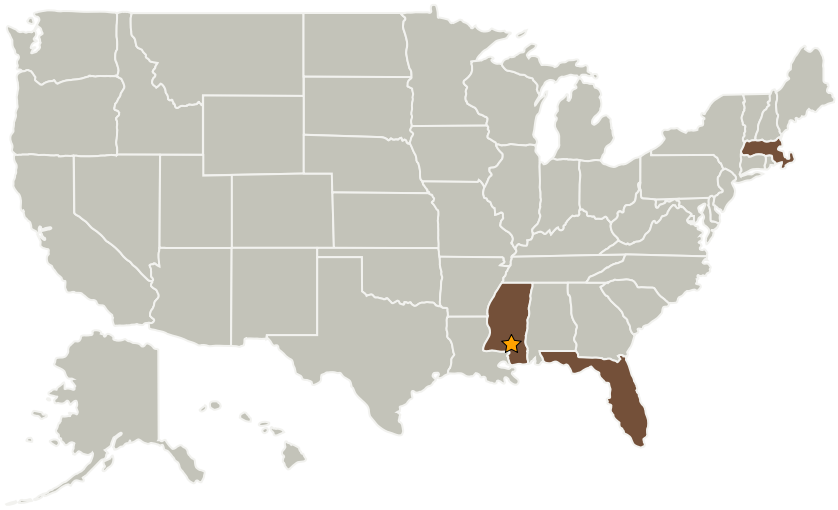
Non-Dispersive Atomic Absorption System for Engine Health Monitoring, Phase I

Table of Contents

Non-Dispersive Atomic Absorption System for Engine Health Monitoring, Phase I

Completed Technology Project (2009 - 2010)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
Aerodyne Research, Inc	Supporting Organization	Industry	Billerica, Massachusetts

Primary U.S. Work Locations	
Florida	Massachusetts
Mississippi	

Project Transitions

January 2009: Project Start

January 2010: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

William W St. Cyr

Principal Investigator:

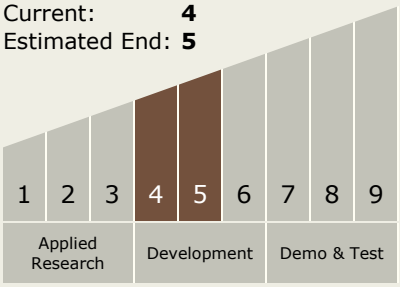
Joda Wormhoudt

Non-Dispersive Atomic Absorption System for Engine Health Monitoring, Phase I

Completed Technology Project (2009 - 2010)

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes